



General

Guideline Title

Bacterial sepsis in pregnancy.

Bibliographic Source(s)

Royal College of Obstetricians and Gynaecologists (RCOG). Bacterial sepsis in pregnancy. London (UK): Royal College of Obstetricians and Gynaecologists (RCOG); 2012 Apr. 14 p. (Green-top guideline; no. 64a). [24 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

In addition to these evidence-based recommendations, the guideline development group also identifies points of best clinical practice in the original guideline document.

Classification of evidence levels (1++ to 4) and grades of recommendations (A-D) are defined at the end of the "Major Recommendations" field.

Which Women Are at Risk of Sepsis in Pregnancy?

D - Multiple risk factors for severe sepsis have been identified by the Confidential Enquiries into Maternal Deaths (CEMD) (see table 1 in the full guideline document).

What Should Prompt Recognition of Sepsis in the Pregnant Woman?

D - All healthcare professionals should be aware of the symptoms and signs of maternal sepsis and critical illness and of the rapid, potentially lethal course of severe sepsis and septic shock. Suspicion of significant sepsis should trigger an urgent referral to secondary care.

D - Clinical signs suggestive of sepsis include one or more of the following: pyrexia, hypothermia, tachycardia, tachypnoea, hypoxia, hypotension, oliguria, impaired consciousness and failure to respond to treatment. These signs, including pyrexia, may not always be present and are not necessarily related to the severity of sepsis.

Clinical features suggestive of sepsis are shown in table 2 of the original guideline document. Diagnostic criteria for sepsis and severe sepsis are provided in appendix 1 and features of toxic shock syndrome are listed in appendix 2 of the original guideline.

What Are the Appropriate Investigations When Sepsis Is Suspected?

D - Blood cultures are the key investigation and should be obtained prior to antibiotic administration; however, antibiotic treatment should be started without waiting for microbiology results.

D - Serum lactate should be measured within six hours of the suspicion of severe sepsis in order to guide management. Serum lactate ≥ 4 mmol/l is indicative of tissue hypoperfusion.

D - Any relevant imaging studies should be performed promptly in an attempt to confirm the source of infection.

Blood cultures and other samples as guided by clinical suspicion of the focus of infection (e.g., throat swabs, mid-stream urine, high vaginal swab, or cerebrospinal fluid) should be obtained prior to starting antibiotic therapy as they may become uninformative within a few hours of commencing antibiotics but must not delay antibiotic therapy. If the methicillin-resistant *Staphylococcus aureus* (MRSA) status is unknown, a pre-moistened nose swab may be sent for rapid MRSA screening where such testing is available. The results of these tests should be reviewed when they become available to allow subsequent optimisation of the antibiotic regime. Similarly, prompt imaging may identify the source of the infection, allowing early definitive treatment, and should not be deferred on the grounds of pregnancy. Use of the resuscitation 'bundle' developed as part of the Surviving Sepsis Campaign is recommended (see table 3 in the original guideline document) and includes measurement of serum lactate within six hours of suspicion of severe sepsis with the result being used to guide management. Arterial blood gas measurement should be undertaken to assess for hypoxia. Laboratory findings suggestive of a diagnosis of sepsis are outlined in appendix 1 of the original guideline document. [Evidence level 4]

Who Should Be Involved in the Collaborative Care of Women with Sepsis?

D - If sepsis is suspected, regular frequent observations should be made. The use of a Modified Early Obstetric Warning Score (MEOWS) chart is recommended. There should be an urgent referral to the critical care team in severe or rapidly deteriorating cases, and the involvement of a consultant obstetrician.

D - The expert advice of a consultant microbiologist or infectious disease physician should be sought urgently when serious sepsis is suspected.

The decision to transfer to intensive care should be decided by the critical care team in conjunction with the obstetric consultant and the consultant obstetric anaesthetist. Cardiac output monitoring, ventilatory support requiring intubation, and renal support would all require transfer to ICU in the majority of units (see table 4 in the original guideline document).

What Empirical and Specific Antimicrobial Therapy Should Be Used to Treat the Woman?

D - Administration of intravenous broad-spectrum antibiotics is recommended within one hour of suspicion of severe sepsis, with or without septic shock.

D - If genital tract sepsis is suspected, prompt early treatment with a combination of high-dose broad-spectrum intravenous antibiotics may be lifesaving.

Information on antimicrobials which may aid in guiding choice is provided in table 5 of the original guideline document; however, hospital guidelines differ, and local guidance should be followed as the incidence of resistant organisms varies throughout the UK.

In addition to antimicrobial therapy, the source of sepsis should be sought and dealt with if possible: for example, by delivery of the baby. [Evidence level 3]

What Is the Role of Intravenous Immunoglobulin (IVIG)?

D - IVIG is recommended for severe invasive streptococcal or staphylococcal infection if other therapies have failed.

Definitions:

Classification of Evidence Levels

1++ High-quality meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a very low risk of bias

1+ Well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias

1– Meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a high risk of bias

2++ High-quality systematic reviews of case-control or cohort studies or high-quality case-control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal

2+ Well-conducted case-control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship

is causal

2- Case-control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal

3 Non-analytical studies, e.g. case reports, case series

4 Expert opinion

Grades of Recommendations

A - At least one meta-analysis, systematic review or randomised controlled trial rated as 1++ and directly applicable to the target population; *or*

A systematic review of randomised controlled trials or a body of evidence consisting principally of studies rated as 1+ directly applicable to the target population and demonstrating overall consistency of results

B - A body of evidence including studies rated as 2++ directly applicable to the target population, and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 1++ or 1+

C - A body of evidence including studies rated as 2+ directly applicable to the target population and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 2++

D - Evidence level 3 or 4; *or*

Extrapolated evidence from studies rated as 2+

Good Practice Point - Recommended best practice based on the clinical experience of the guideline development group

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Bacterial sepsis in pregnancy

Note: Sepsis arising due to viral, fungal or other infectious agents is outside the scope of this guideline. Bacterial sepsis following pregnancy in the puerperium is the subject of a separate Green-top Guideline.

Guideline Category

Diagnosis

Evaluation

Management

Risk Assessment

Treatment

Clinical Specialty

Family Practice

Infectious Diseases

Internal Medicine

Obstetrics and Gynecology

Intended Users

Advanced Practice Nurses

Hospitals

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To cover the recognition and management of serious bacterial illness in the antenatal and intrapartum periods, arising in the genital tract or elsewhere, and its management in secondary care

Target Population

Pregnant women suspected of, or diagnosed with, serious bacterial sepsis in primary or secondary healthcare

Interventions and Practices Considered

1. Recognizing signs and symptoms of maternal sepsis
2. Blood culture
3. Initiation of broad-spectrum intravenous antibiotic treatment within one hour of suspected sepsis without waiting for microbiology results
4. Measurement of serum lactate within six hours of the suspicion of severe sepsis
5. Imaging studies
6. Regular observations of all vital signs (including temperature, pulse rate, blood pressure and respiratory rate) with recording on a Modified Early Obstetric Warning Score (MEOWS) chart
7. Urgent referral to critical care team
8. Involvement of consultant obstetrician, microbiologist, and infectious disease specialists
9. Intravenous immunoglobulin (IVIG) for severe invasive streptococcal or staphylococcal infection
10. Fetal monitoring and management of delivery and the postpartum
11. Consideration of infection control issues

Major Outcomes Considered

- Risk for maternal sepsis in pregnancy
- Utility of signs and symptoms in recognizing sepsis in pregnancy
- Incidence of maternal death
- Incidence of organ dysfunction
- Effectiveness of treatment

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

This Royal College of Obstetricians and Gynaecologists (RCOG) guideline was developed in accordance with standard methodology for producing RCOG Green-top Guidelines (see the "Availability of Companion Documents" field). The Cochrane Database of Systematic Reviews, DARE, EMBASE, Medline and PubMed (electronic databases) were searched for relevant randomised controlled trials, systematic reviews and meta-analyses. The search was restricted to articles published between 1980 to May 2011. Search terms included: 'sepsis and pregnancy', 'bacterial infection and pregnancy', 'antenatal bacterial infection', 'bacterial sepsis', 'intrapartum septic shock', 'intrapartum infection', 'maternal pyrexia', 'maternal fever', 'systemic inflammatory response syndrome', 'chorioamnionitis', 'genital tract sepsis', 'listeria infection', 'group A *Streptococcus*', '*Streptococcus pyogenes*', '*Streptococcus* and pregnancy', and the search limited to humans and English language. The National Health Service (NHS) Evidence, Health Information Resources and the National Guidelines Clearing House were also searched for relevant guidelines and reviews.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Classification of Evidence Levels

1++ High-quality meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a very low risk of bias

1+ Well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias

1– Meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a high risk of bias

2++ High-quality systematic reviews of case-control or cohort studies or high-quality case-control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal

2+ Well-conducted case-control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal

2– Case-control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal

3 Non-analytical studies, e.g. case reports, case series

4 Expert opinion

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Reviewing and Grading of Evidence

Once the evidence has been collated for each clinical question it needs to be appraised and reviewed (refer to section 3 in "Development of RCOG Green-top guidelines: producing a clinical practice guideline" for information on the formulation of the clinical questions; see the "Availability of Companion Documents" field). For each question, the study type with least chance of bias should be used. If available, randomised controlled trials (RCTs) of suitable size and quality should be used in preference to observational data. This may vary depending on the outcome being examined.

The level of evidence and the grade of the recommendations used in this guideline originate from the guidance by the Scottish Intercollegiate Guidelines Network (SIGN) Grading Review Group, which incorporates formal assessment of the methodological quality, quantity, consistency, and applicability of the evidence base. The methods used to appraise individual study types are available from the SIGN Web site (www.sign.ac.uk/methodology/checklists.html). An objective appraisal of study quality is essential, but paired reviewing by guideline leads may be impractical because of resource constraints.

Once evidence has been collated and appraised, it can be graded. A judgement on the quality of the evidence will be necessary using the grading system (see the "Rating Scheme for the Strength of the Evidence" field). Where evidence is felt to warrant 'down-grading', for whatever reason, the rationale must be stated. Evidence judged to be of poor quality can be excluded. Any study with a high chance of bias (either 1– or 2–) will be excluded from the guideline and recommendations will not be based on this evidence. This prevents recommendations being based on poor-quality RCTs when higher-quality observational evidence is available.

Methods Used to Formulate the Recommendations

Expert Consensus

Informal Consensus

Description of Methods Used to Formulate the Recommendations

Guideline Development

The development of guidelines involves more than the collation and reviewing of evidence. Even with high-quality data from systematic reviews of randomised controlled trials, a value judgement is needed when comparing one therapy with another. This will therefore introduce the need for consensus.

Royal College of Obstetricians and Gynaecologists (RCOG) Green-top guidelines are drafted by nominated developers, in contrast to other guideline groups such as the National Institute for Health and Clinical Excellence (NICE) and the Scottish Intercollegiate Guidelines Network (SIGN), who use larger guideline development groups. Equally, in contrast to other guideline groups, the topics chosen for development as Green-top guidelines are concise enough to allow development by a smaller group of individuals.

In agreeing the precise wording of evidence-based guideline recommendations and in developing consensus-based 'good practice points', the Guidelines Committee (GC) will employ an informal consensus approach through group discussion. In line with current methodologies, the entire development process will follow strict guidance and be both transparent and robust. The RCOG acknowledges that formal consensus methods have been described, but these require further evaluation in the context of clinical guideline development. It is envisaged that this will not detract from the rigor of the process but prevent undue delays in development.

Rating Scheme for the Strength of the Recommendations

Grades of Recommendations

A - At least one meta-analysis, systematic review or randomised controlled trial rated as 1++ and directly applicable to the target population; *or*

A systematic review of randomised controlled trials or a body of evidence consisting principally of studies rated as 1+ directly applicable to the target population and demonstrating overall consistency of results

B - A body of evidence including studies rated as 2++ directly applicable to the target population, and demonstrating overall consistency of results;
or

Extrapolated evidence from studies rated as 1++ or 1+

C - A body of evidence including studies rated as 2+ directly applicable to the target population and demonstrating overall consistency of results;
or

Extrapolated evidence from studies rated as 2++

D - Evidence level 3 or 4; *or*

Extrapolated evidence from studies rated as 2+

Good Practice Point - Recommended best practice based on the clinical experience of the guideline development group

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Following discussion in the Guidelines Committee (GC), each Green-top guideline is formally peer reviewed. At the same time, the draft guideline is published on the Royal College of Obstetricians and Gynaecologists (RCOG) Web site for further peer discussion before final publication.

All comments will be collated by the RCOG and tabulated for consideration by the guideline leads. Each comment will require discussion. Where comments are rejected then justification will need to be made. Following this review, the document will be updated and the GC will then review the revised draft and the table of comments.

Once the GC signs-off on the guideline, it is submitted to the Standards Board for approval before final publication.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate management of bacterial sepsis in pregnancy to improve maternal survival rates

Potential Harms

Not stated

Contraindications

Contraindications

The main contraindication to intravenous immunoglobulin (IVIG) use is a congenital deficiency of immunoglobulin A. Its use in women with severe staphylococcal and streptococcal sepsis should be discussed with infectious disease colleagues or medical microbiologists.

Qualifying Statements

Qualifying Statements

- These recommendations are not intended to dictate an exclusive course of management or treatment. They must be evaluated with reference to individual patient needs, resources and limitations unique to the institution and variations in local populations. It is hoped that this process of local ownership will help to incorporate these guidelines into routine practice. Attention is drawn to areas of clinical uncertainty where further research might be indicated.
- The Royal College of Obstetricians and Gynaecologists (RCOG) produces guidelines as an educational aid to good clinical practice. They present recognised methods and techniques of clinical practice, based on published evidence, for consideration by obstetricians and gynaecologists and other relevant health professionals. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor or other attendant in the light of clinical data presented by the patient and the diagnostic and treatment options available within the appropriate health services. This means that RCOG Guidelines are unlike protocols or guidelines issued by employers, as they are not intended to be prescriptive directions defining a single course of management. Departure from the local prescriptive protocols or guidelines should be fully documented in the patient's case notes at the time the relevant decision is taken.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Audit Criteria/Indicators

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Timeliness

Identifying Information and Availability

Bibliographic Source(s)

Royal College of Obstetricians and Gynaecologists (RCOG). Bacterial sepsis in pregnancy. London (UK): Royal College of Obstetricians and Gynaecologists (RCOG); 2012 Apr. 14 p. (Green-top guideline; no. 64a). [24 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2012 Apr

Guideline Developer(s)

Royal College of Obstetricians and Gynaecologists - Medical Specialty Society

Source(s) of Funding

Royal College of Obstetricians and Gynaecologists (RCOG)

Guideline Committee

Guidelines Committee

Composition of Group That Authored the Guideline

Authors: Dr D Pasupathy MRCOG, London; Dr M Morgan MB ChB FRCPath, Consultant Microbiologist, Royal Devon & Exeter NHS Foundation Trust; Dr FS Plaat MA MB BS FRCA, Consultant, Department of Anaesthesia, Hammersmith Hospital, London; and Dr KS Langford FRCOG, London

Peer reviewers: Mr DI Fraser MRCOG, Norwich; Dr MA Harper FRCOG, Belfast; Dr R Daniels, Heart of England NHS Foundation Trust, Birmingham; Mr I Babarinsa MRCOG, Gloucester; Centre for Maternal and Child Enquiries (CMACE); Health Protection Agency; Obstetric Anaesthetists' Association (OAA); RCOG Consumers' Forum; Royal College of General Practitioners; Royal College of Midwives

Guideline Committee Lead Reviewers: Mr M Griffiths FRCOG, Luton; Dr AJ Thomson MRCOG, Paisley, Scotland; and Dr KR Harding FRCOG, London

Financial Disclosures/Conflicts of Interest

Conflicts of interest: none declared.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the [Royal College of Obstetricians and Gynaecologists \(RCOG\) Web site](#) .

Availability of Companion Documents

The following are available:

- Development of RCOG Green-top guidelines: policies and processes. Clinical Governance Advice No 1a. London (UK): Royal College of Obstetricians and Gynaecologists (RCOG); 2006 Nov. 6 p. Electronic copies: Available from the [Royal College of Obstetricians and Gynaecologists \(RCOG\) Web site](#) .
- Development of RCOG Green-top guidelines: producing a scope. Clinical Governance Advice No 1b. London (UK): Royal College of Obstetricians and Gynaecologists (RCOG); 2006 Nov. 4 p. Electronic copies: Available from the [RCOG Web site](#) .
- Development of RCOG Green-top guidelines: producing a clinical practice guideline. Clinical Governance Advice No 1c. London (UK): Royal College of Obstetricians and Gynaecologists (RCOG); 2006 Nov. 13 p. Electronic copies: Available from the [RCOG Web site](#) .
- Development of RCOG Green-top guidelines: consensus methods for adaptation of Green-top guidelines. Clinical Governance Advice No 1d. London (UK): Royal College of Obstetricians and Gynaecologists (RCOG); 2010 Feb. 9 p. Electronic copies: Available from the [RCOG Web site](#) .

In addition, suggested audit topics are available in section 14 of the [original guideline document](#) .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on July 12, 2012. The information was verified by the guideline developer on September 25, 2012.

Copyright Statement

This NGC summary is based on the original guideline, which is subject to the guideline developer's copyright restrictions.

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouse[®] (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at <http://www.guideline.gov/about/inclusion-criteria.aspx>.

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.